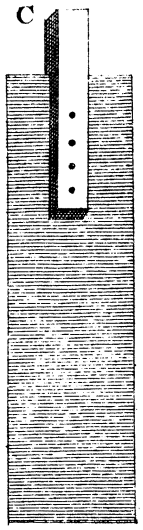
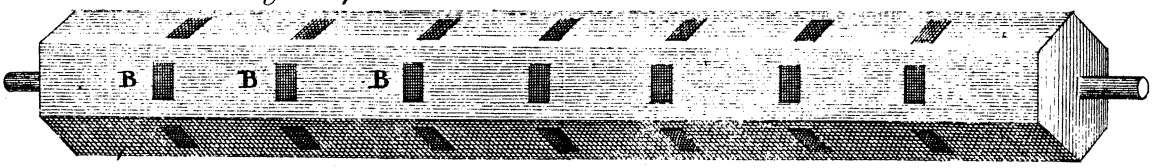


Fig. 1. p. 1.



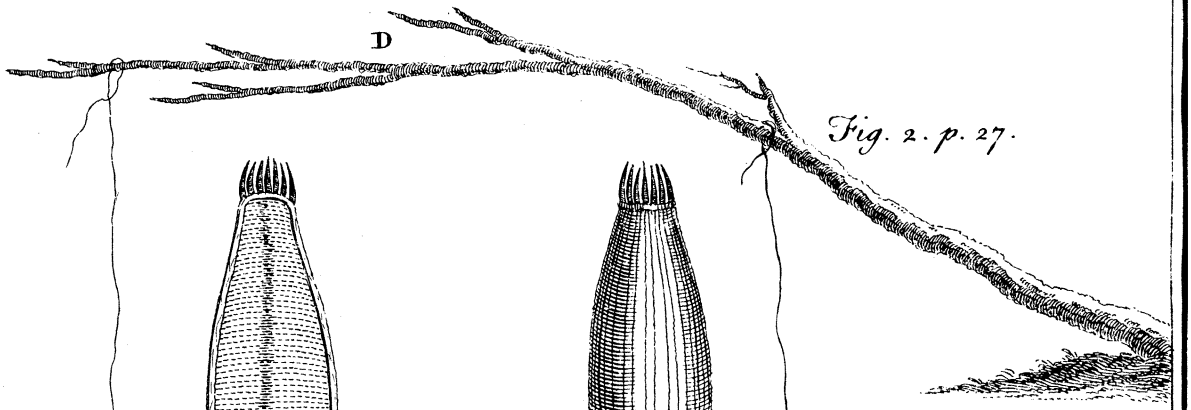


Fig. 2. p. 27.

Fig. 3. p. 62.

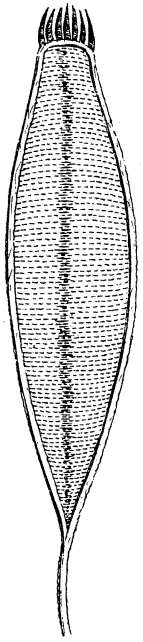


Fig. 5. p. 64.

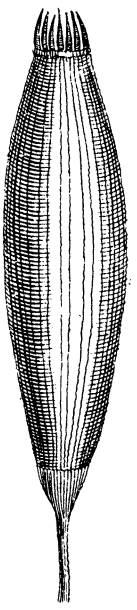


Fig. 4. p. 63.

Fig. 6. p. 66.

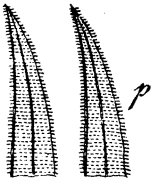
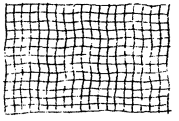


Fig. 7. p. 66.



J. Mynde sc.

Body. The Pain has not been always equally ſharp, but he ſays, that the firſt time he loſt the Uſe of his Breath for ſome Moments; and he then felt ſo intenſe a Pain all along his right Arm, that he at firſt apprehended ill Conſequences from it; tho' it ſoon after went off without Inconvenience.

It is to be remarked, that in this Experiment he ſtood ſimply upon the Floor, and not upon the Cakes of Reſin. It does not ſucceed with all Glaſſes; and tho' he has tried ſeveral, he has had perfect Succeſs with none but thoſe of *Bohemia*. He has tried *Engliſh* Glaſſes without any Effect. That Glaſs with which it beſt ſucceeded was a Beer-Glaſs.

Mr. *Muſchenbroeck* the Profeſſor has repeated his Experiment, holding in his Hand a hollow Bowl exceeding thin, full of Water; and he ſays he experienced a moſt terrible Pain. He ſays, the Glaſs muſt not be at all wet on the Outſide.

XII. *A Letter from Mr.* John Hill, *Apothecary, to the* Preſident, *concerning the Manner of the Seeding of* Moſſes; *and in particular of the* HYPNUM terreſtre, trichoides, luteovirenus, vulgare, majus, capitulis erectis. RAII Synopſ. *Ed.* 3. *pag.* 84.

SIR,

Read Feb. 13. 1745-6. *with Alterations.*

THE many late Diſcoveries of the Seeds of Vegetables (formerly ſuppoſed to produce none) have opened a Way

Way to an extenſive Scene of Knowledge; and led to a Series of Obſervations, in which there will be found an almoſt inexhauſtible Store of Delight and Admiration. The Moſſes, in particular, one of the moſt beautiful Parts of the vegetable Creation, will afford the curious Obſerver more Matter of Entertainment than perhaps any other Claſs of it. A Specimen of which I do myſelf the Honour of communicating to you in this Letter.

The particular Obſervations it contains, though new and ſurpriſing, you will allow unqueſtionable in Fact and Certainty, when I add, that they are what I have not only often repeated myſelf, but have alſo ſhewn to Mr. *Baker*, Dr. *Parſons*, and Mr. *Needham*, Gentlemen of too nice Eyes, and too converſant in Obſervations of this kind, not to have diſcovered Miſtakes, if there had been any; and who all agree, that no Diſcovery by the Microſcope was ever clearer.

The Manner of ſeeding of the Moſſes in general is a Thing perhaps as little underſtood, as any Part of the vegetable Syſtem: What I have to offer here is the explaining and deſcribing it clearly, in one Species at leaſt, from a Number of Obſervations made on it in its different States, and at different Seaſons of the Year.

The thorough Knowledge of the Operations of Nature in the Seeding of one of theſe little Plants, may, I hope, be a fair Step to the diſcovering it in them all. And the almoſt infinite Variety of not only *Species*, but *Genus's*, in this Claſs of Vegetables, ſeems to promiſe the Inquirer a vaſt Variety of new Diſcoveries.

I ſhall

I ſhall not trouble you, to whom I very well know there is no need of repeating any Part of the Labours of the antient or later Naturaliſts, with an Account of the erroneous Opinions of others on this Subject; you will find, by this Account, that thoſe who have been uſed to judge well in other Parts of Botany, have been altogether miſtaken here: And even the accurate Mr. *Hook*, who of all others has come neareſt a Diſcovery of the Truth, and who actually ſaw ſome Part of the Organization of theſe little Bodies, was ſo far from making the leaſt Gueſs at the Nature and Uſes of what he ſaw, that he even miſtook the Structure of it.

The particular Species of Moſs, whoſe Head I here ſend you a Deſcription of, is the *Hypnum terreſtre, trichoïdes, luteovirens, vulgare, majus, capitulis erectis.* Raii Synopſ. *ed.* 3. *p.* 84. *Hypnum vulgare, ſericeum, recurvum, capſulis erectis cuſpidatis,* Dill. Hiſt. Muſc. 323. It is frequent on old Walls, and there is a Specimen of it in the third Volume of the *Hortus ſiccus* of *Engliſh* Plants of my collecting, which you honour with a Place in your Library.

The Head of this Moſs appears to the naked Eye (as at *Fig.* 3. TAB. I.) of a pale-brown Colour, and ſmooth Surface, and is in Part cover'd with a membranaceous *Calyptra*, relembling in Shape an Extinguiſher, or a Funnel inverted. When this *Calyptra* is taken off, and the Head placed before the Microſcope, the Surface of it is ſeen to be ridg'd with longitudinal *Striæ*, the Baſis of the Head is of a dark Orange-colour, and more opaque than the reſt; and the Top is bounded by an orange-colour'd Ring, ſwelling out ſomething beyond

beyond the Surface of the contiguous Parts of the Head.

A cloſe Obſervation and good Glaſſes have inform'd me, that in this little Head there are not wanting the Parts eſſential to the Fructification of what are commonly called the more perfect Plants.

This Ring is truly a monophyllous undulated *Calyx*; and within it ariſe ſixteen pyramidal fimbriated *Stamina*: Theſe are of a pale-greeniſh Colour, and are loaded with a white oval *Farina*: The *Stamina* all bend toward each other from their Baſes, and almoſt meet in a Point at their Tops. This is their Appearance when the Head is nearly ripe, and is what is expreſs'd at *Fig.* 4. TAB. I. And immediately under the Arch formed by theſe *Stamina* is plac'd a ſlender, cylindric, hollow *Piſtillum*, thro' which the *Farina* makes its Way, and is diſperſed among the Seeds in the Head.

The external Membrane of the Head is a Continuation of the outer Covering of the Stalk, and is ſtrengthen'd at its Baſis by four or five Ribs, which ſoon loſe themſelves in the *Striæ*.

A longitudinal Section of the Head ſhews, that the Membrane before-mentioned incloſes a Seed-veſſel ſo large as to fill it every Way: In moſt Places they touch; but where-ever they do not, a Number of very ſlender, white, and tranſparent Fibres ſhew themſelves, which join them together. This Seed-veſſel is fill'd with perfect and very beautiful Seeds; they are round, tranſparent while unripe, but afterwards opaque, and of a very beautiful Green; which Colour they retain even when dried.

The Number of Seeds in one of theſe Heads is aſtoniſhingly great: I have many times attempted to count

count them, in ſuch as were full, and out of which few or none had been diſlodg'd by the Cutting; and as the Accounts, at different Times, and various in Heads, have not much differ'd, I ſhall venture to inſert a Gueſs from them. It will eaſily be conceived, that in Seeds ſo minute as well as numerous, this muſt be a very difficult Task; and indeed to count every ſeparate Seed, I believe would be not much leſs than impoſſible: The Method therefore by which I make the Calculation is this.

I count in an eighth Part of the Circumference of one Half of the Head nine Seeds, $9 \times 8 = 72$. there are therefore 72 Seeds in a Line, which reaches round the Circumference of one Half of the Head. I judge the Length of this Half to be to its Circumference as 3 to 2, or thereabout: Therefore, in one longitudinal Line in it, there muſt be 96 Seeds; the whole Quantity in the Half of the Head therefore is $72 \times 96 = 6912$; and, doubling that for the equal Number of Seeds of the other Half, there appear to be in one Head $2 \times 6912 = 13824$ Seeds.

Fig. 5. TAB. I. ſhews a longitudinal Section of the Head with the Seeds, the *Stamina*, and the joining of the Capſule with the external Membrane of the Head.

The *Stamina*, examined alone, afford a moſt pleaſing Sight; they are compoſed of a white tranſparent Subſtance, of a pyramidal Figure, everywhere cover'd with a pale-greeniſh Cruſt; which is the Receptacle of a vaſt Quantity of an oval *Farina*, ſo extremely minute, as to be viſible only with the moſt powerful Magnifiers in the double Microſcope.

The outer Membrane of the Head becomes ſeparable from the Capſule when perfectly ripe and dry; and

and then, view'd in the double Microſcope, ſhews a reticular Texture, not viſible in it before.

When this Head is firſt produced from the Plant, the *Stamina* are very ſlender, and ſtand erect; the Head is ſcarce any thicker than the Stalk, and the *Calyptra* covers the Whole, to ſhield the tender Subſtance of the *Farina* from external Injuries. As the *Farina* afterwards ſwells in the *Stamina*, the Seeds alſo in the Head increaſe in Bulk, and become viſible, and are then tranſparent; but when it is perfectly ripe, the *Calyptra* falls off, and the Wind diſlodging the *Farina* at times, as it ripens ſome ſooner, ſome later, it makes its Way through the *Piſtillum* into the Head, and the Seeds then become much larger and opaque; to favour the Falling of the *Farina* into the *Piſtillum*, the *Stamina*, as they ripen, are, by the Increaſe of Thickneſs in the Head, thrown farther and farther from each other at their Baſes, but bend inward at the Points, ſo as to form a kind of Arch over the Opening of it.

The annual Product of theſe moſt minute Seeds is aſtoniſhing: An ingenious Gentlemen has given, in N°. 468 of theſe *Tranſactions*, *p.* 320. an Account of the wonderful Increaſe of the Mallow; one of which he found to yield in one Year 200,000. But this is much inferior to thoſe of the little Plant before us; for, allowing to a Root of this 8 Branches, and to each Branch ſix Heads (which any one, who will obſerve it in a thriving Situation, will find a very moderate Computation), the Produce of this is $6 \times 13824 = 82944$. and $8 \times 82944 = 663552$ Seeds, the annual Produce of one Seed; 13824 of which are contain'd in a Head, whoſe Length is

but $\frac{1}{9}$ of an Inch, and its Diameter but $\frac{1}{23}$ of an Inch, and whoſe Weight is but the thirteenth Part of a Grain. I am,

SIR,

With the greateſt Reſpect,

Broadway, *Weſtminſter*, *Feb.* 6. 1745-6.

Your very obedient,

Humble Servant,

John Hill.

Explanation of the Figures, TAB. I.

Fig. 3. ſhews the Head of this Moſs in its natural Dimenſions, with and without the *Calyptra.*

Fig. 4. The ſame view'd thro' a powerful Magnifier, without its *Calyptra.*

Fig. 5. A longitudinal Section of the ſame.

Fig. 6. *Stamina* taken off from the Head, and view'd by a more powerful Magnifier.

Fig. 7. A Piece of the outer Membrane of the Head, ſhewing its reticular Texture.